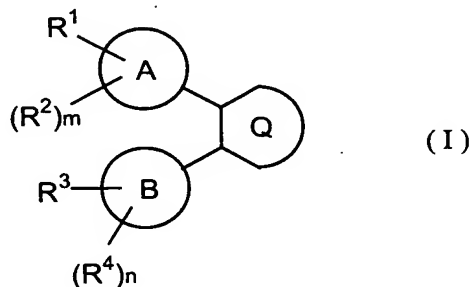


Claims

1. A large conductance calcium-activated K channel opener comprising a compound of the formula (I):

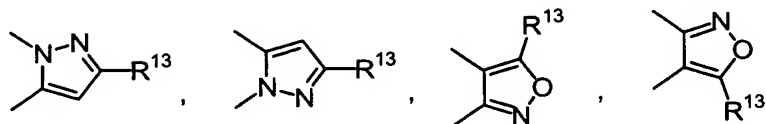


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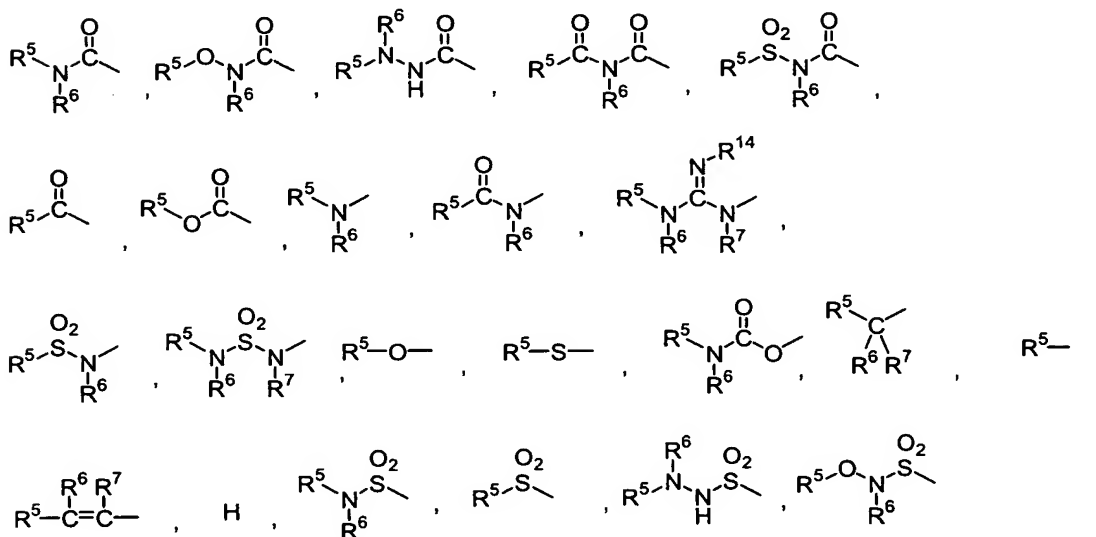
wherein Ring A is benzene or a heterocyclic ring;
Ring B is benzene, a heterocyclic ring, a cycloalkane or a cycloalkene;

10

Ring Q is a group selected from the following formulae:



R¹ and R³ may be the same or different from each other, and each is a group selected from the following formulae:



15

R⁵ and R⁶ may be the same or different from each

other, and each is (1) hydrogen, (2) an optionally substituted alkyl, (3) an optionally substituted cycloalkyl which may be fused with an aryl, (4) an optionally substituted aryl, (5) an optionally substituted heterocyclic group, or (6) an alkoxy-carbonyl, or (7) R^5 and R^6 may be combined to form an optionally substituted heterocyclic ring in combination with atom(s) to which they are bonded;

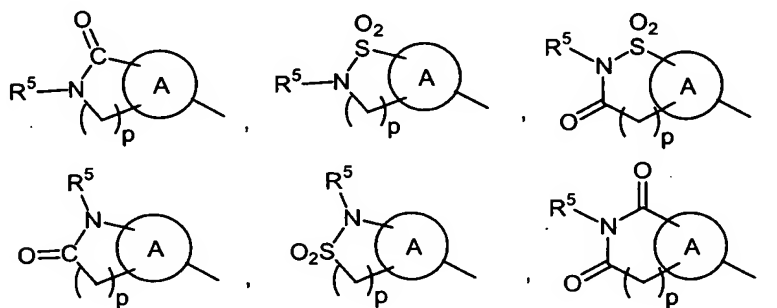
R^7 is (1) hydrogen, (2) an optionally substituted alkyl, (3) an optionally substituted cycloalkyl which may be fused with an aryl, (4) an optionally substituted aryl, or (5) an alkoxycarbonyl;

R^{14} is hydrogen, an alkoxy, hydroxyl, cyano or an optionally substituted alkyl;

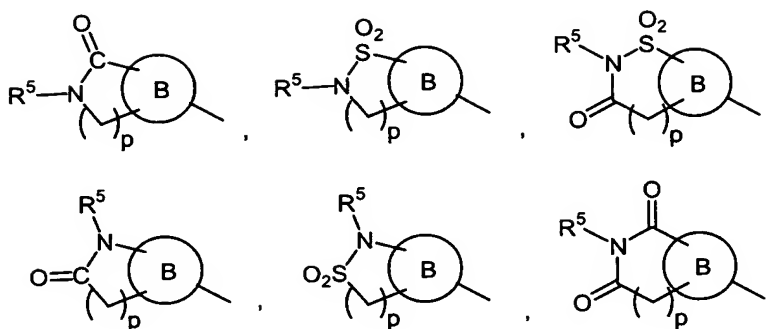
m and n may be the same or different from each other, and each is 0, 1 or 2;

R^2 and R^4 may be the same or different from each other, and each is oxo, cyano, nitro, hydroxyl, an alkoxy, a halogen, carboxy, an alkoxycarbonyl, an optionally substituted carbamoyl, an optionally substituted amino or an optionally substituted alkyl; provided that when m is 2, two R^2 may be the same or different from each other, and when n is 2, two R^4 may be the same or different from each other;

or R^1 and R^2 may be combined to form a group selected from the following formulae with Ring A;



or R^3 and R^4 may be combined to form a group selected from the following formulae with Ring B;

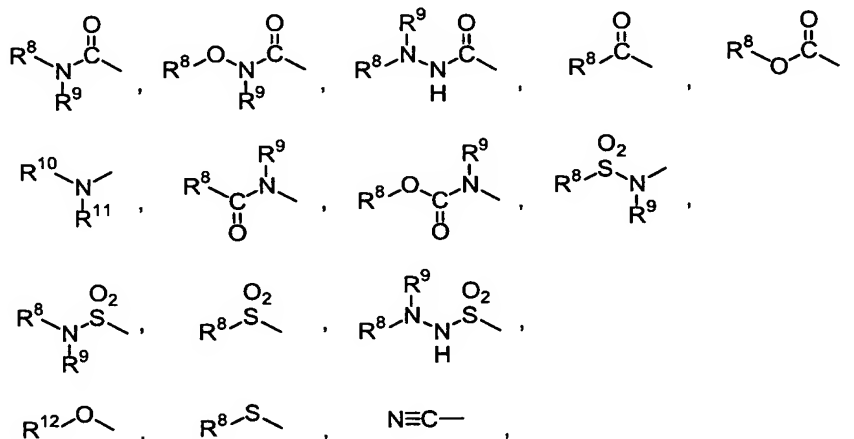


p is an integer of 1 to 3; and

R¹³ is (1) an optionally substituted alkyl, (2) cyano, (3) hydrogen, (4) a halogen, (5) an optionally substituted amino, (6) an alkenyl, (7) an optionally substituted carbamoyl, (8) an alkoxycarbonyl, (9) carboxy, (10) a heterocyclic group, (11) hydroxyl or (12) an alkoxy,

or a pharmaceutically acceptable salt thereof as an active ingredient.

2. The large conductance calcium-activated K channel opener according to Claim 1, wherein the substituent(s) for the optionally substituted alkyl of R⁵, R⁶ and R⁷ are 1 to 7 independently selected halogen(s) and/or 1 to 3 groups selected from the following groups:



an optionally substituted heterocyclic group and an optionally substituted aryl,

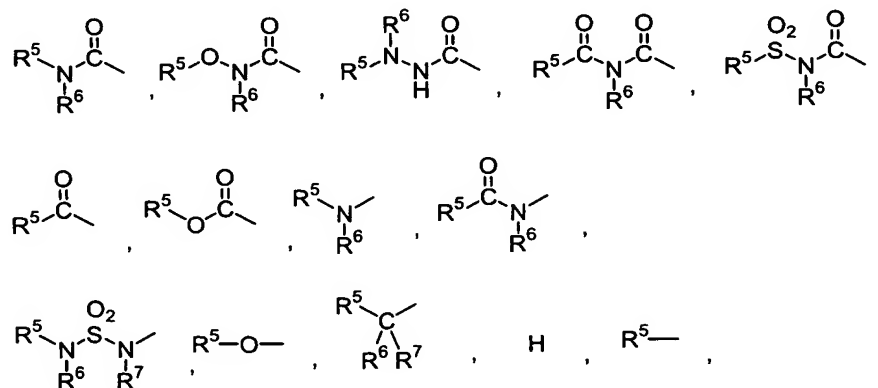
wherein R⁸ and R⁹ may be the same or different from each other, and each is (1) hydrogen, (2) an alkyl which may be substituted by an optionally substituted

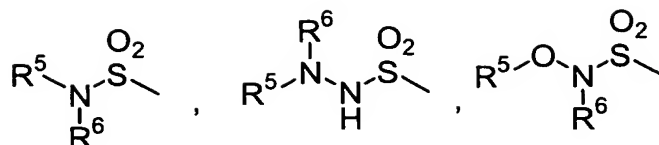
aryl or by an optionally substituted heterocyclic group, (3) a hydroxyalkyl, (4) an alkoxy-alkyl, (5) an alkoxycarbonyl, (6) an optionally substituted heterocyclic group or (7) an optionally substituted aryl, or (8) R⁸ and R⁹ may be combined to form an optionally substituted heterocyclic ring in combination with atom(s) to which they are bonded; R¹⁰ and R¹¹ may be the same or different from each other, and each is (1) hydrogen, (2) an alkyl which may be substituted by an optionally substituted aryl or by an optionally substituted heterocyclic group, (3) a hydroxyalkyl, (4) an alkoxyalkyl, (5) an alkanoyl, (6) an alkylsulfonyl, (7) an alkoxycarbonyl or (8) an optionally substituted heterocyclic group; R¹² is (1) hydrogen, (2) an alkyl which may be substituted by an optionally substituted aryl or by an optionally substituted heterocyclic group, (3) a hydroxyalkyl, (4) an alkoxyalkyl or (5) an optionally substituted heterocyclic group.

20

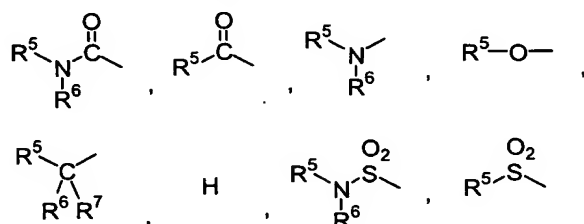
3. The large conductance calcium-activated K channel opener according to Claim 1, wherein Ring B is benzene, a heterocyclic ring, a cycloalkane or a cycloalkene,

25 R¹ is a group selected from the following formulae:

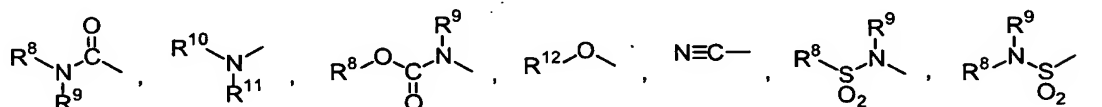




R³ is a group selected from the following formulae:



R⁵ is (1) hydrogen, (2) an alkyl which may be substituted
5 by 1 to 7 independently selected halogen(s) and/or by 1 to
3 groups selected from the following groups:



an optionally substituted heterocyclic group and an optionally substituted aryl,

(3) an optionally substituted cycloalkyl which may be fused
10 with an aryl, (4) an optionally substituted aryl, or (5) an
optionally substituted heterocyclic group;

R⁶ is hydrogen, an alkyl or an alkoxycarbonyl, or R⁵ and R⁶
may be combined to form an optionally substituted hetero-
cyclic ring in combination with atoms to which they are
bonded;

15 R⁷ is hydrogen, an alkyl or an alkoxycarbonyl;

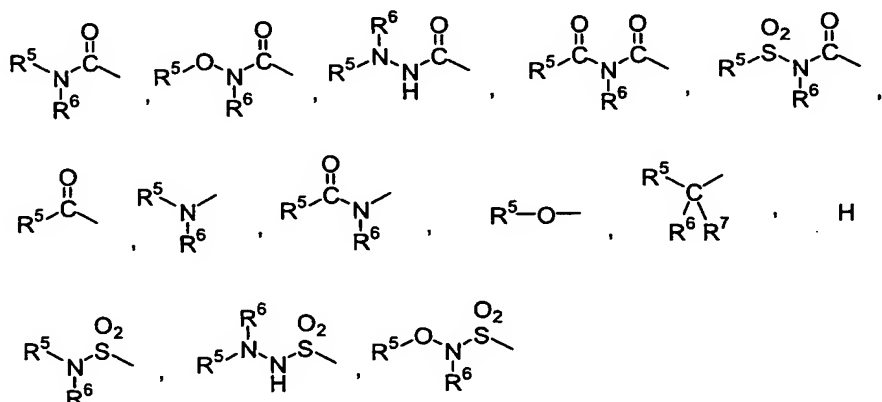
R⁸ and R⁹ may be the same or different from each other, and
each is (1) hydrogen, (2) an alkyl which may be substituted
by an optionally substituted aryl or by an optionally
substituted heterocyclic group, (3) a hydroxyalkyl, (4) an
alkoxyalkyl, (5) an optionally substituted heterocyclic
20 group, (6) an optionally substituted aryl, or (7) R⁸ and R⁹
may be combined to form an optionally substituted hetero-
cyclic ring in combination with atom(s) to which they are
bonded;

25 R¹⁰ and R¹¹ may be the same or different from each other,
and each is (1) hydrogen, (2) an alkyl which may be

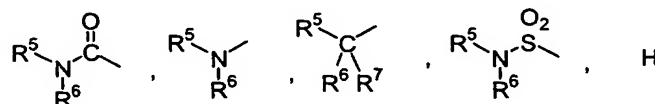
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10 group;
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R² and R⁴ may be the same or different from each other, and each is oxo, cyano, nitro, hydroxyl, an alkoxy, a halogen or an optionally substituted alkyl.

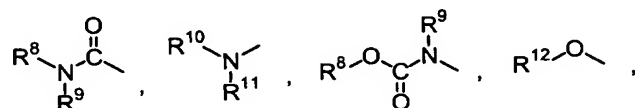
Ring B is (1) benzene or (2) a heterocyclic ring selected
20 from thiophene, pyridine, pyrimidine, pyrazine, benzo-
thiophene, 2,3-dihydroindole, 2,3-dihydrobenzofuran and
1,4-benzodioxane or (3) a cyclohexene;
R¹ is a group selected from the following formulae:



25 R^3 is a group selected from the following formulae:



R⁵ is (1) hydrogen, (2) an alkyl which may be substituted by 1 to 7 independently selected halogen(s) and/or by 1 or 2 groups selected from the following groups:



an optionally substituted heterocyclic group and an optionally substituted aryl.

5 (3) an optionally substituted cycloalkyl which may be fused with an aryl, (4) an optionally substituted aryl, or (5) an optionally substituted heterocyclic group;

R⁶ is hydrogen or an alkyl, or R⁵ and R⁶ may be combined to form a heterocyclic ring which may be substituted by
10 hydroxyalkyl, in combination with atom(s) to which they are bonded;

R⁷ is hydrogen or an alkyl;

R⁸ and R⁹ may be the same or different from each other, and each is (1) hydrogen, (2) an alkyl which may be substituted
15 by an optionally substituted aryl or by an optionally substituted heterocyclic group, (3) hydroxyalkyl or (4) an alkoxyalkyl;

R¹⁰ and R¹¹ may be the same or different from each other, and each is (1) hydrogen, (2) an alkyl which may be
20 substituted by an optionally substituted aryl or by an optionally substituted heterocyclic group, (3) a hydroxyalkyl, (4) an alkoxyalkyl or (5) an optionally substituted heterocyclic group;

R¹² is (1) hydrogen, (2) an alkyl which may be substituted
25 by an optionally substituted aryl or by an optionally substituted heterocyclic group, (3) a hydroxyalkyl, (4) an alkoxyalkyl or (5) an optionally substituted heterocyclic group;

m and n may be the same or different from each other, and
30 each is 0, 1 or 2;

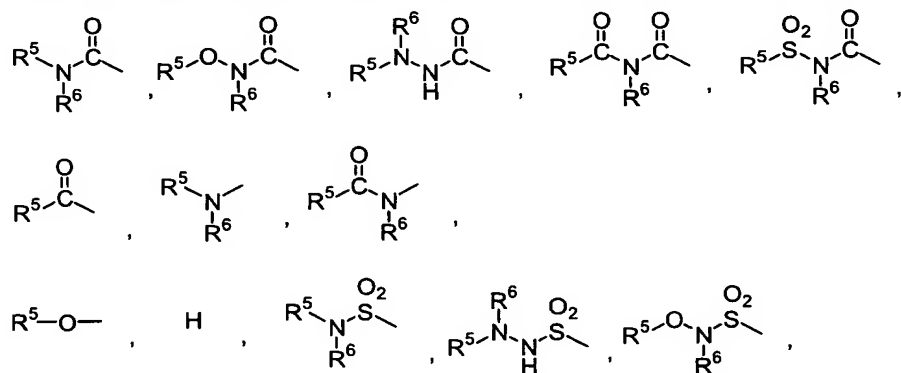
R² and R⁴ may be the same or different from each other, and each is oxo, cyano, nitro, hydroxyl group, an alkoxy, a halogen or an alkyl which may be substituted by hydroxyl

group; and

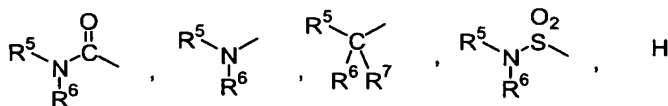
R^{13} is (1) hydrogen, (2) an alkyl which may be substituted by a group selected from a halogen, hydroxyl group, an optionally substituted alkoxy, cyano, carboxy, carbamoyl, an alkoxy carbonyl, an optionally substituted amino and an optionally substituted imino, (3) an alkenyl, or (4) a heterocyclic group.

5. The large conductance calcium-activated K channel opener according to Claim 1, wherein
Ring A is benzene, thiophene, pyridine or pyrazole;
Ring B is (1) benzene, (2) a heterocyclic ring selected from thiophene, pyridine, pyrimidine, pyrazine, benzo-thiophene, 2,3-dihydroindole and 1,4-benzodioxane, or (3) a cyclohexene;

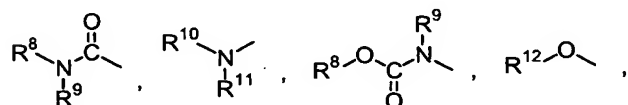
R^1 is a group selected from the following formulae:



R^3 is a group selected from the following formulae:



20 R^5 is (1) hydrogen, (2) an alkyl which may be substituted by 1 to 7 independently selected halogen(s) and/or by 1 or 2 groups selected from the following groups:



an optionally substituted heterocyclic group and an optionally substituted aryl,

(3) a cycloalkyl fused with an aryl which may be substi-

tuted by hydroxyl(s), or (4) a heterocyclic group;
R⁶ is hydrogen or an alkyl, or R⁵ and R⁶ may be combined to
form a heterocyclic ring which may be substituted by
hydroxyalkyl;

5 R⁷ is hydrogen or an alkyl;

R⁸, R⁹, R¹⁰ and R¹¹ may be the same or different from each
other, and each is (1) hydrogen, (2) an alkyl which may be
substituted by an optionally substituted aryl or by an
optionally substituted heterocyclic group, (3) a hydroxy-

10 alkyl, (4) an alkoxyalkyl, (5) an optionally substituted
heterocyclic group, or (6) an optionally substituted aryl;
R¹² is (1) hydrogen, (2) an alkyl which may be substituted
by an optionally substituted aryl or by an optionally
substituted heterocyclic group, (3) a hydroxyalkyl, (4) an
15 alkoxyalkyl or (5) an optionally substituted heterocyclic
group;

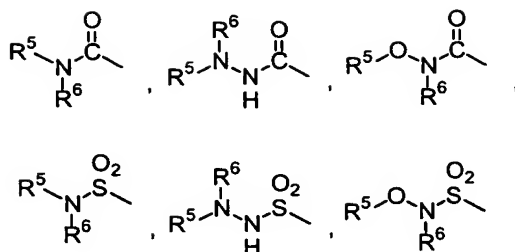
m and n may be the same or different from each other, and
each is 0, 1 or 2;

R² and R⁴ may be the same or different from each other, and
20 each is cyano, nitro, hydroxyl, a halogen, an alkyl or an
alkoxy; and

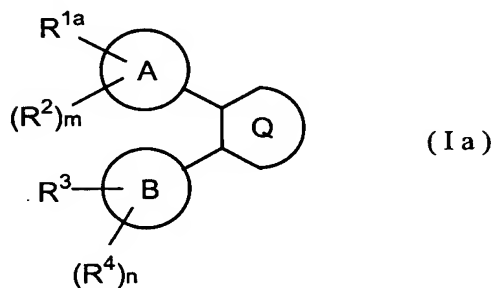
R¹³ is (1) hydrogen, (2) an alkyl which may be substituted
by group(s) selected from a halogen, hydroxyl, an alkoxy
which may be substituted by group(s) selected from a
25 halogen and phenyl, cyano, carboxy, carbamoyl, an alkoxy-
carbonyl, an amino which may be substituted by phenyl, and
an imino which may be substituted by group(s) selected from
an alkoxy and hydroxyl, (3) an alkenyl or (4) 4,5-dihydro-
xazol-2-yl.

30

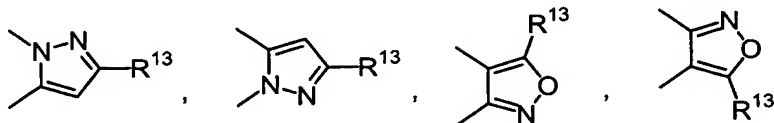
6. The large conductance calcium-activated K channel
opener according to any one of Claims 1 to 5, wherein
R¹ is a group selected from the following formulae:



7. A compound of the formula (Ia):

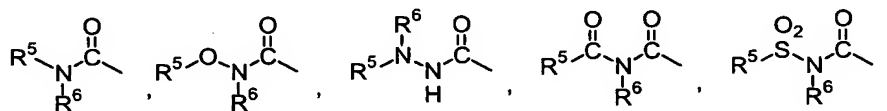


5 wherein Ring A is benzene or a heterocyclic ring;
Ring B is benzene, a heterocyclic ring, a cycloalkane
or a cycloalkene;
Ring Q is a group selected from the following
formulae:

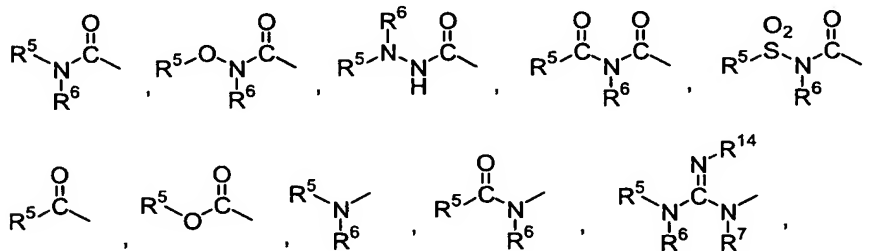


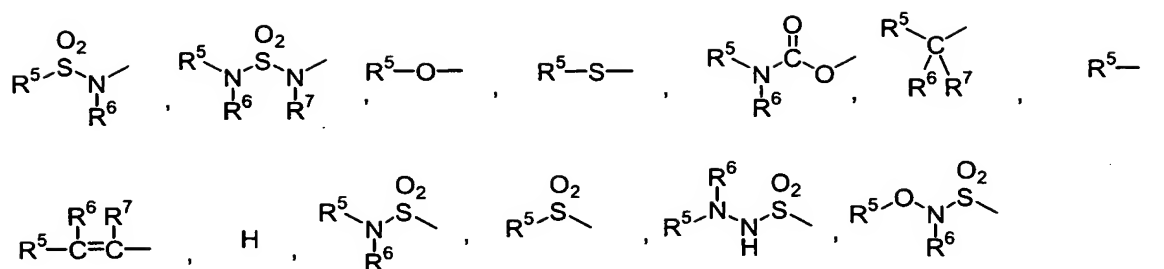
10

R^{1a} is a group selected from the following formulae:



R^3 is a group selected from the following formulae:





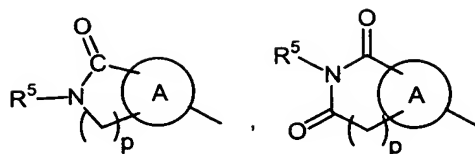
R^5 and R^6 may be the same or different from each other, and each is (1) hydrogen, (2) an optionally substituted alkyl, (3) an optionally substituted cycloalkyl which may be fused with an aryl, (4) an optionally substituted aryl, (5) an optionally substituted heterocyclic group, or (6) an alkoxy-carbonyl, or (7) R^5 and R^6 may be combined to form an optionally substituted heterocyclic ring in combination with atom(s) to which they are bonded;

R^7 is (1) hydrogen, (2) an optionally substituted alkyl, (3) an optionally substituted cycloalkyl which may be fused with an aryl, (4) an optionally substituted aryl, or (5) an alkoxycarbonyl;

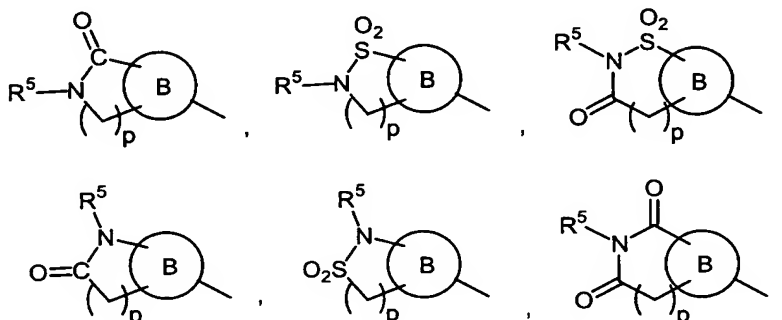
R^{14} is hydrogen, an alkoxy, hydroxyl, cyano or an optionally substituted alkyl;

m and n may be the same or different from each other, and each is 0, 1 or 2;

R^2 and R^4 may be the same or different from each other, and each is oxo, cyano, nitro, hydroxyl, an alkoxy, a halogen, carboxy, an alkoxycarbonyl, an optionally substituted carbamoyl, an optionally substituted amino or an optionally substituted alkyl; provided that when m is 2, two R^2 may be the same or different from each other, and when n is 2, two R^4 may be the same or different from each other; or R^{1a} and R^2 may be combined to form a group of the following formula with Ring A:



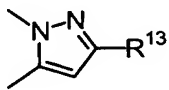
or R^3 and R^4 may be combined to form a group selected from the following formulae with Ring B:



p is an integer of 1 to 3; and

R^{13} is (1) an optionally substituted alkyl, (2) cyano, (3) hydrogen, (4) a halogen, (5) an optionally substituted amino, (6) an alkenyl, (7) an optionally substituted carbamoyl, (8) an alkoxycarbonyl, (9) carboxy, (10) a heterocyclic group, (11) hydroxyl or (12) an alkoxy;

provided that (i) the compound in which Ring A and Ring B are benzenes;
Ring Q is



R^3 is hydroxyl, an alkoxy or a cycloalkyloxy which are substituted at 2-position,

R^4 is methoxy substituted at 6-position, and

R^{13} is an alkoxycarbonyl or carboxy,

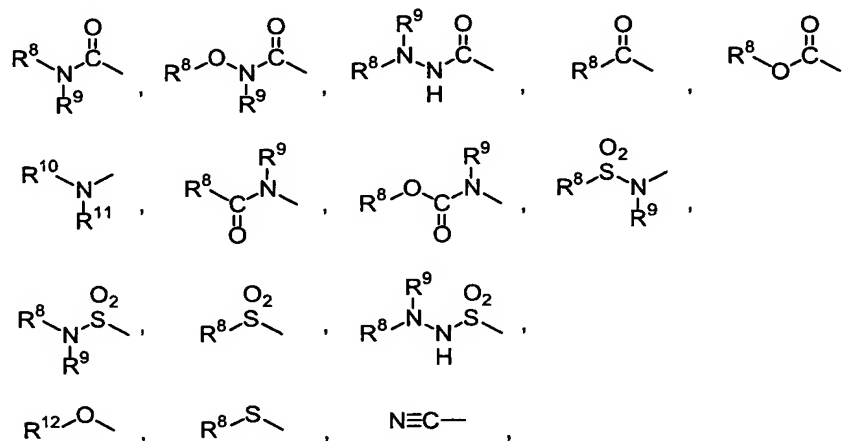
(ii) N-(3-isopropoxypropyl)-4-(3-methyl-5-phenyl-1H-pyrazol-1-yl)benzamide,

(iii) 4-(1-(4-aminosulfonylphenyl)-3-difluoromethyl-1H-pyrazol-5-yl)benzamide, and

(iv) 4-[5-(4-chlorophenyl)-3-(3-hydroxypropyl)-1H-pyrazol-1-yl]-N-methylbenzohydroxamic acid

are excluded,
or a pharmaceutically acceptable salt thereof.

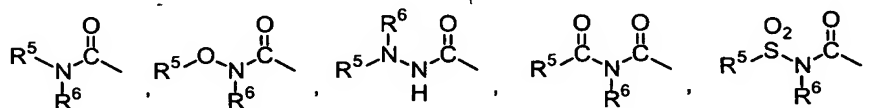
8. The compound or a pharmaceutically acceptable salt
5 thereof according to Claim 7, wherein the substituent(s)
for the optionally substituted alkyl of R⁵, R⁶ and R⁷ are 1
to 7 independently selected halogen(s) and/or 1 to 3 groups
selected from the following groups:



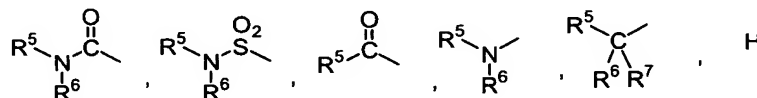
an optionally substituted heterocyclic group and an optionally substituted aryl,
10 wherein R⁸ and R⁹ may be the same or different from
each other, and each is (1) hydrogen, (2) an alkyl
which may be substituted by an optionally substituted
aryl or by an optionally substituted heterocyclic
group, (3) a hydroxyalkyl, (4) an alkoxyalkyl, (5) an
15 alkoxy carbonyl, (6) an optionally substituted hetero-
cyclic group or (7) an optionally substituted aryl,
or (8) R⁸ and R⁹ may be combined to form an optionally
substituted heterocyclic ring in combination with
atom(s) to which they are bonded; R¹⁰ and R¹¹ may be
20 the same or different from each other, and each is
(1) hydrogen, (2) an alkyl which may be substituted
by an optionally substituted aryl or by an optionally
substituted heterocyclic group, (3) a hydroxyalkyl,
(4) an alkoxyalkyl, (5) an alkanoyl, (6) an alkyl-
25 sulfonyl, (7) an alkoxy carbonyl or (8) an optionally
substituted heterocyclic group; R¹² is (1) hydrogen,

(2) an alkyl which may be substituted by an optionally substituted aryl or by an optionally substituted heterocyclic group, (3) a hydroxyalkyl, (4) an alkoxyalkyl or (5) an optionally substituted heterocyclic group.

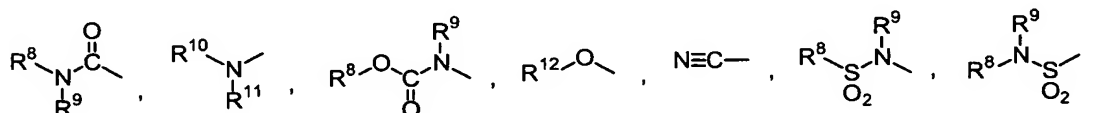
9. The compound or a pharmaceutically acceptable salt thereof according to Claim 7, wherein Ring B is benzene, a heterocyclic ring or a cycloalkane;
 10 R^{1a} is a group selected from the following formulae:



R³ is a group selected from the following formulae:



R⁵ is (1) hydrogen, (2) an alkyl which may be substituted by 1 to 7 independently selected halogen(s) and/or by 1 to 3 groups selected from the following groups:



an optionally substituted heterocyclic group and an optionally substituted aryl,

(3) an optionally substituted cycloalkyl which may be fused with an aryl, (4) an optionally substituted aryl, or (5) an optionally substituted heterocyclic group;

R⁶ is hydrogen or an alkyl, or R⁵ and R⁶ may be combined to form an optionally substituted heterocyclic ring in combination with atom(s) to which they are bonded;
 R⁷ is hydrogen, an alkyl or an alkoxycarbonyl;
 25 R⁸ and R⁹ may be the same or different from each other, and each is (1) hydrogen, (2) an alkyl which may be substituted by an optionally substituted aryl or by an optionally substituted heterocyclic group, (3) a hydroxyalkyl, (4) an alkoxyalkyl, (5) an optionally substituted heterocyclic

group, (6) an optionally substituted aryl, or (7) R^8 and R^9 may be combined to form an optionally substituted heterocyclic ring in combination with atom(s) to which they are bonded;

5 R^{10} and R^{11} may be the same or different from each other, and each is (1) hydrogen, (2) an alkyl which may be substituted by an optionally substituted aryl or by an optionally substituted heterocyclic group, (3) a hydroxyalkyl, (4) an alkoxyalkyl, (5) an alkanoyl, (6) an alkylsulfonyl, (7) an
10 alkoxy carbonyl or (8) an optionally substituted heterocyclic group;

R^{12} is (1) hydrogen, (2) an alkyl which may be substituted by an optionally substituted aryl or by an optionally substituted heterocyclic group, (3) a hydroxyalkyl, (4) an
15 alkoxyalkyl or (5) an optionally substituted heterocyclic group;

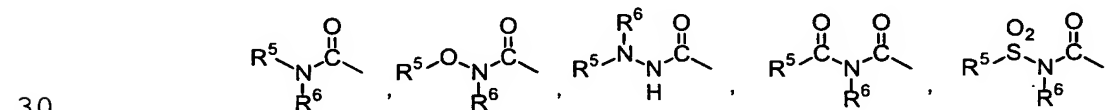
m and n may be the same or different from each other, and each is 0, 1 or 2; and

R^2 and R^4 may be the same or different from each other, and
20 each is oxo, cyano, nitro, hydroxyl, an alkoxy, a halogen or an optionally substituted alkyl.

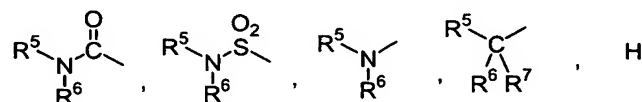
10. The compound or a pharmaceutically acceptable salt thereof according to Claim 7, wherein

25 Ring B is (1) benzene or (2) a heterocyclic ring selected from thiophene, pyridine, pyrimidine, pyrazine, benzothiophene, 2,3-dihydroindole, 2,3-dihydrobenzofuran and 1,4-benzodioxane;

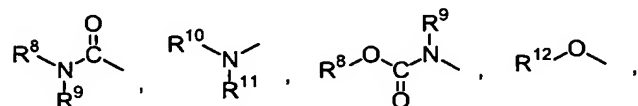
R^{1a} is a group selected from the following formulae:



R^3 is a group selected from the following formulae:



R⁵ is (1) hydrogen, (2) an alkyl which may be substituted by 1 to 7 independently selected halogen(s) and/or by 1 or 2 groups selected from the following groups:



an optionally substituted heterocyclic group and an optionally substituted aryl,

(3) an optionally substituted cycloalkyl which may be fused with an aryl, (4) an optionally substituted aryl, or (5) an optionally substituted heterocyclic group;

R⁶ is hydrogen or an alkyl, or R⁵ and R⁶ may be combined to form a heterocyclic ring which may be substituted by a hydroxyalkyl, in combination with atom(s) to which they are bonded;

R⁷ is hydrogen or an alkyl;

R⁸ and R⁹ may be the same or different from each other, and each is (1) hydrogen, (2) an alkyl which may be substituted by an optionally substituted aryl or by an optionally substituted heterocyclic group, (3) a hydroxyalkyl or (4) an alkoxyalkyl;

R¹⁰ and R¹¹ may be the same or different from each other, and each is (1) hydrogen, (2) an alkyl which may be substituted by an optionally substituted aryl or by an optionally substituted heterocyclic group, (3) a hydroxyalkyl, (4) an alkoxyalkyl or (5) an optionally substituted heterocyclic group;

R¹² is (1) hydrogen, (2) an alkyl which may be substituted by an optionally substituted aryl or by an optionally substituted heterocyclic group, (3) a hydroxyalkyl, (4) an alkoxyalkyl or (5) an optionally substituted heterocyclic group;

m and n may be the same or different from each other, and each is 0, 1 or 2;

R² and R⁴ may be the same or different from each other, and each is oxo, cyano, nitro, hydroxyl, an alkoxy, a halogen or an alkyl which may be substituted by hydroxyl(s); and

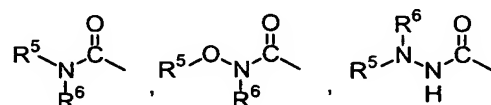
R^{13} is (1) hydrogen, (2) an alkyl which may be substituted by group(s) selected from a halogen, hydroxyl, an optionally substituted alkoxy, cyano, carboxy, an optionally substituted amino and an optionally substituted imino, (3) an alkenyl, or (4) a heterocyclic group.

11. The compound or a pharmaceutically acceptable salt thereof according to Claim 7, wherein

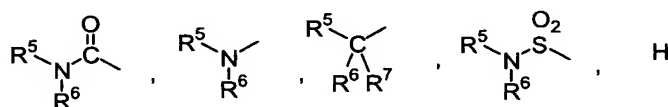
Ring A is benzene, thiophene, pyridine or pyrazole;

10 Ring B is (1) benzene, or (2) a heterocyclic ring selected from thiophene, pyridine, pyrimidine, pyrazine, benzo-thiophene and 1,4-benzodioxane;

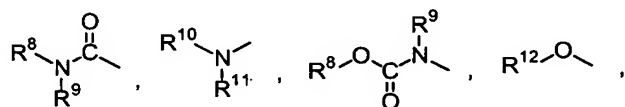
R^{1a} is a group selected from the following formulae:



15 R^3 is a group selected from the following formulae:



R^5 is (1) hydrogen, (2) an alkyl which may be substituted by 1 to 7 independently selected halogen(s) and/or by 1 or 2 groups selected from the following groups:



20 an optionally substituted heterocyclic group and an optionally substituted aryl,

(3) a cycloalkyl fused with an aryl which may be substituted by hydroxyl, or (4) a heterocyclic group;

R^6 is hydrogen or an alkyl, or R^5 and R^6 may be combined to form a heterocyclic ring which may be substituted by

25 hydroxyalkyl;

R^7 is hydrogen or an alkyl;

R^8 , R^9 , R^{10} and R^{11} may be the same or different from each other, and each is (1) hydrogen, (2) an alkyl which may be substituted by an optionally substituted aryl or by an

optionally substituted heterocyclic group, (3) a hydroxy-alkyl, (4) an alkoxyalkyl, (5) an optionally substituted heterocyclic group, or (6) an optionally substituted aryl; R^{12} is (1) hydrogen, (2) an alkyl which may be substituted
5 by an optionally substituted aryl or by an optionally substituted heterocyclic group, (3) a hydroxyalkyl, (4) an alkoxyalkyl or (5) an optionally substituted heterocyclic group;

m and n may be the same or different from each other, and
10 each is 0, 1 or 2;

R^2 and R^4 may be the same or different from each other, and each is cyano, nitro, hydroxyl, a halogen, an alkyl or an alkoxy; and

R^{13} is (1) hydrogen, (2) an alkyl which may be substituted
15 by group(s) selected from a halogen, hydroxyl, an alkoxy which may be substituted by group(s) selected from a halogen and phenyl, cyano, carboxy, carbamoyl, an alkoxy-carbonyl, an amino which may be substituted by phenyl, and an imino which may be substituted by group(s) selected from
20 an alkoxy and hydroxyl, (3) an alkenyl or (4) 4,5-dihydroxazol-2-yl.

12. A medicine comprising the compound or a pharmaceuti-
cally acceptable salt thereof according to any one of
25 Claims 7 to 11.

13. The medicine according to Claim 12, which is a large conductance calcium-activated K channel opener.

30 14. The large conductance calcium-activated K channel opener according to any one of Claims 1 to 5 and 13, which is for the prophylaxis and/or treatment of pollakiuria, urinary incontinence, asthma or chronic obstructive pulmonary diseases.

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